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ABSTRACT

The central problem of this study was to determine the hierarchial levels of common professional education competencies needed by community college and secondary school vocational instructors. A survey-type questionnaire was developed using a six-point ordinal scale corresponding to the major headings of Bloom's cognitive taxonomy. The population consisted of selected vocational education instructors from Oregon's community colleges and secondary schools. The results were analyzed using the Q-Mode and R-Mode factor analysis techniques. It was concluded that 57 of the 99 professional competencies could be classified as having high levels of correlation and could be grouped into meaningful competency clusters typified by the study's sample population. The data indicated vocational-technical educators resembled one another with regard to the hierarchial values assigned to the professional education competencies. (GEB)

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Technical Report

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The Application of Bloom's Cognitive Taxonomy to Selected Professional Education Competencies

by

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July, 1971

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Statement of the Problem

The studies of Gunderson (1971), Lindahl (1971), and Miller (1971) re-emphasized the emerging concepts of the Division of Vocational, Adult and Community College Education for the preparation of vocational educators at all levels, and were designed to facilitate the process of developing vocational teacher preparation curricula. The accent of these studies reflect the need for flexibility in teacher education programs proposed by Dillon (1969), as well as the necessity to identify the unique aspects of each area of vocational education, and what is common to two or more areas.

As distinctive as these steps are to the identification of common professional education competencies, the importance of developing a hierarchical framework within these tasks cannot be minimized. The function and relationship of the hierarchical structure in educational behavior is explained by Krathwohl (1965) as follows:

> The taxonomic approach makes its greatest contribution in forcing the instructor to spell out his instructional goals in terms of overt behavior . . . Thus, the instructor knows what kinds of behavior (levels) he is trying to develop in the classroom (p. 84).

Achnowledging the necessity of restructuring its teacher education programs to parallel evolving national and state needs, the Division of Vocational, Adult and Community College, Oregon State University, has described an innovative approach to the problems of vocational teacher curriculum development in its Proposal for Change (1970). The proposal stresses the need to identify common elements of required behavioral competencies, and argues,

> Oregon State University should take the leadership in building an empirically based training program which is validly related to those tasks with which the beginning teacher will find himself confronted in the field (p.4).

To assist in the structuring of an empirically-based vocational teacher preparatory program, the central problem of this study was to determine the hierarchical levels of common professional education competencies needed by community college and secondary school vocational instructors.

Related Methodological Studies

The use of factor analysis as an analytical tool is common practice in the examination of personnel tasks and employee attitude surveys, and has been used extensively in the scientific fields where variations of individual differences must be identified. As computer programs become readily available, says Kirchner and Lucas (1970), the use of factor analysis as a technique for the analysis of interrelationships will also increase. Kirchner points out that factor analysis simplifies confusing data by clustering those items that go together, and from such clustering, one can determine the basic factors present in the study.

Essentially, there are minimal differences in definition and use of factor analysis as described by Cattell (1952), Good and Scates (1954), Harman (1967), and Thurston (1947), who agree that structurally it is a rigid arithmetic tool.

When development of curricular structure is considered from the viewpoint of task performance, the use of factor analysis to study professional competencies and behavioral objectives is not unusual. The substantiation of factor analysis in vocational education curriculum development has been evidenced by several national studies.

Halfin and Courtney (1970) identified the common core of curricular experiences for the training of technical teachers. The study utilized a Likert-type instrument, and was administered to 150 teachers randomly

selected from each of five vocational disciplines. Ten states were used in the study. The data gathered were processed by factor analysis which rotated the 130 test items orthogonally. Six interpretable factors were identified for use in curriculum development. The major interest of this study was directed toward determining the common training requirements of secondary school level vocatioinal instructors. Tuckman's (1970) SCOPE study utilized factor analysis to test a three-dimensional domain-process-object taxonomy to classify educationally-relevant behavior.

The use of a check list to gather task data from employees in the field has been found to be a valid method in task analysis, and has been used by the previously mentioned studies. Courtney (1967) developed a device used for establishing the core of professional knowledge and the abilities required in training programs for vocational education teachers. The knowledge and skills described in the research instrument included items selected from a review of the literature, and utilized a consulting group of specialists from business, industry, and vocational education. A similar technique was used by Crawford (1971), Gunderson (1971), Lindahl (1971), and Miller (1971).

To identify clusters of knowledge and competencies needed by merchandising employees, Ertel (1966) administered a checklist to employees to obtain facts about the major types of tasks required. Ertel's method may be thought of as unique in that task lists were not submitted to employees in a randomly selected group of stores, but only to those businesses considered as modern "leading edge" firms where the nature of the work performed was most likely to represent the prevailing direction for the foreseeable future.

Sjorgen (1967) used a three-day training period to familiarize

respondents with the instrument's procedures, in a study to identify common behavioral factors as a basis for pre-entry preparation of workers for gainful employment. The instrument was personally administered to respondents at their homes or places of business. While completing the questionnaire, each respondent had a copy of the scale descriptions for periodic reference.

Use of the cognitive taxonomy is not necessarily restricted to or functional only for curriculum improvement in vocational education. Kirsner (1968) demonstrated how specific behavioral objectives formulated within the hierarchy of the major levels and sub-levels of Bloom's taxonomy of educational objectives can easily be applied to teacher preparation in educational psychology programs.

The Instrument

The instrument used in the study was a survey-type questionnaire designed primarily for mailing, but modified for personal administration to selected vocational education competencies in combination with a six-point ordinal scale corresponding to the major headings of Bloom's (1956) cognitive taxonomy. The scale permitted each respondent to judgmentally score the taxonomic level considered necessary for adequate behavior required by the responsibilities of his work. Essentially, the instrument was a slight modification of the one used by Gunderson (1971), Lindahl (1971), and Miller (1971) in their four-Western-state study to determine the degree of task proficiencies required for vocational educators at the community college level.[1]

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[1] See Appendix A for a copy of the instrument.

The Dependent Variable

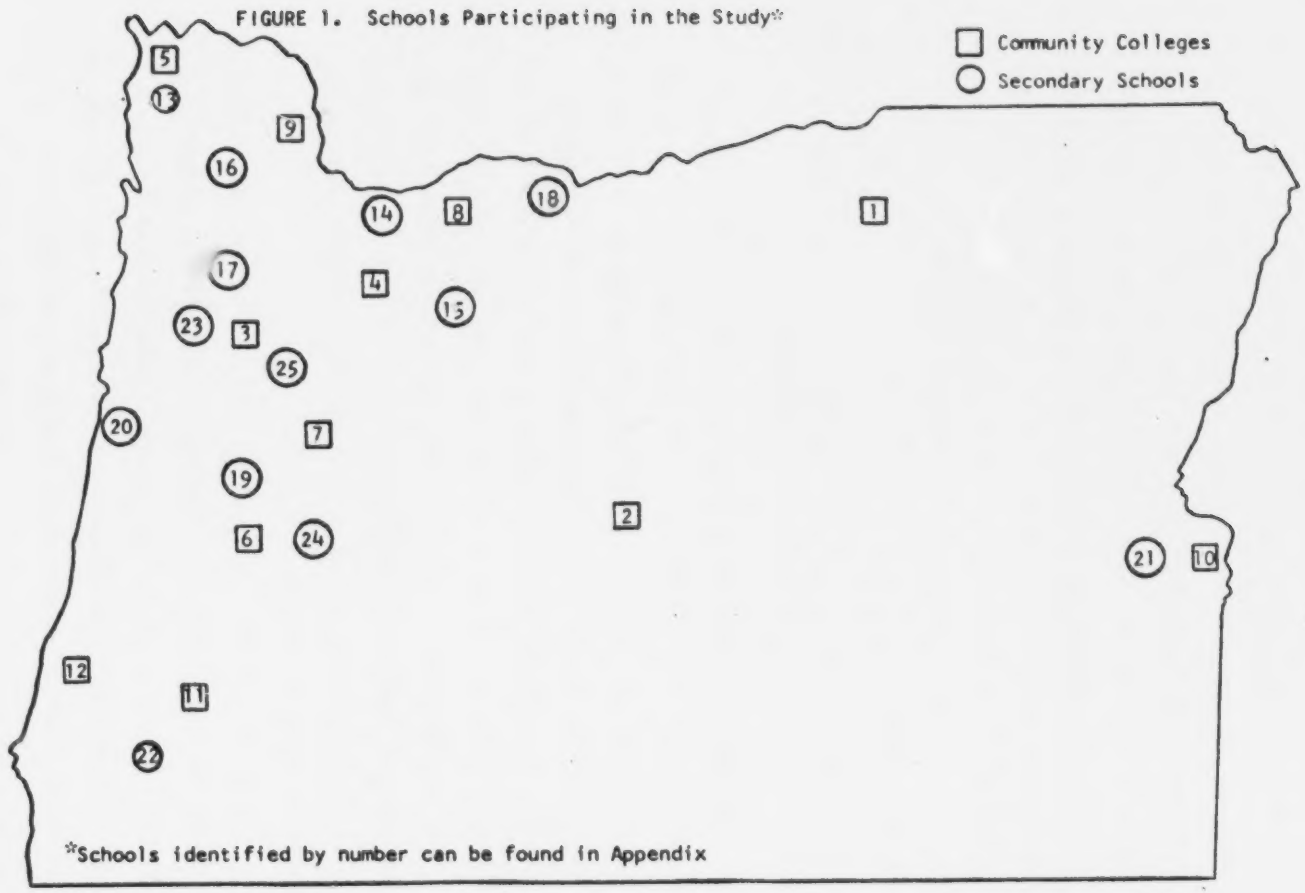
The dependent variable in the study was a score assigned by respondents on a six-point ordinal scale to indicate the hierarchical level they considered necessary in their work for each of the 99 professional education competencies. In a personal interview setting, respondents were asked to indicate professional judgments based upon their teaching experience. Hierarchical values and major heading designations corresponded exactly to those presented in Bloom's taxonomy: (1) Knowledge, (2) Comprehension, (3) Application, (4) Analysis, (5) Synthesis, and (6) Evaluation.

Selection of the Sample

The population used in the study consisted of selected effective vocational education instructors from Oregon's community colleges and secondary schools. Four instructors were recommended by the Deans of Instruction or Directors of Vocational Education at each of the institutions; four instructors were recommended from each of the 13 randomly selected secondary schools by the building principals. Not all recommended secondary school respondents were able to take part in the study, but the total sample used in the study consisted of 94 respondents who represented vocational-technical instructors in Oregon's community colleges and secondary schools.

Three criteria were considered for the selection of the secondary schools sampled. First, the school had to offer diverse vocational education programs; second, the vocational education staffs had to be of sufficient size to permit the building principal a reasonable opportunity to select one or more effective instructors as respondents. Thirdly, secondary schools meeting the first two criteria had to be broadly

FIGURE 1. Schools Participating in the Study*



*Schools identified by number can be found in Appendix

distributed within the state so as to offer each geographical area and corresponding populations an equal opportunity for participation in the study. The primary population meeting these criteria consisted of 138 secondary schools with a minimum student population of 200 or more. Secondary schools used in the study were randomly selected.[1] The total number of full-time vocational-technical instructors employed in the state at the time of the study was approximately 944.

Effective teachers were considered as those judged as being effective in their work by their major supervisors. The criteria used for selection of the instructors were identified by Cosgrove[2] as specific factors of teacher effectiveness, and are as follows:

A. Knowledge and organization of subject matter.

B. Adequacy and relations with students in class.

C. Adequacy of plans and procedures in class.

D. Enthusiasm in working with students.

An analysis of the Q-Mode data generated by the studies of Gunderson (1971), Lindahl (1971) and Miller (1971) indicated that no major differences existed among the responses of the community college instructors examined in California, Colorado, Oregon, and Washington. Therefore, it was assumed a valid approach to confine the determination of the hierarchical levels of the 99 professional competencies to Oregon's 12 community colleges. The results of Cotrell's (1970) study, in which few differences were found between secondary school and post-secondary vocational instructors in 19 states and 7 occupational service areas, further suggested that the same assumption could be applied to

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[1] A Table of Random Numbers was used to select the sample.

[2] See Gage (1963) p.341.

Oregon's secondary schools.

The Statistical Design

The major focus of this study was to determine the hierarchical structure of common professional education competencies needed by community college and secondary school vocational education instructors. Research by Gunderson, Lindahl, and Miller, and that by Crawford (1969), Cotrell (1970), and Halfin and Courtney (1970), provided the foundation for the general design of this study which includes the following elements:

A. The population for the study consisted of full-time vocational-technical instructors from Oregon's community college and secondary schools. A total sample of 94 vocational instructors was used in the study.

B. Based on their teaching experiences, respondents were asked to react to each of the 99 competencies by indicating on a six-point orginal scale the hierarchical level they considered to be necessary in the performance of their responsibilities as teachers.

C. Clusters of competencies were generated through the use of factor analytic Q-Mode and R-Mode. The modes took on the following characteristics for the study.

   1. The Q-Mode analysis essentially involved the ordering of respondents according to the competencies included in the study. Thus, this form of analysis provides a measure of commonality among the various vocational instructors comprising the sample.

2. The R-Mode is one which orders competencies according to the respondents included in the study, and provides for a clustering of competencies according to the hierarchical structure of the responses. Hence, the 99 dependent variables studied were grouped hierarchically through this analysis.

3. Competencies with rotated factor loading of $\pm$.450 or larger were considered for inclusion of the item in a factor or cluster.[1]

D. A median test[2] was conducted on the data to contrast the differences between the responses of the community college and secondary school vocational instructors. The median test provides information regarding whether it is likely that two groups have been drawn from populations with the same medians.

The critical region for the null hypothesis level was set at $\alpha = .05$ with the degrees of freedom equal to 1. The Chi-square table was used in determining the theoretical values for the test of significance. Since $N > 50$ and no cell frequency was less than 5, χ^2 corrected for continuity was used to test the null hypothesis.

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[1]See Fruchter (1954): Factor loadings of .20 or less are usually regarded as insignificant, loadings of .20 to .30 as low; .30 to .50 as moderate; .50 to .70 and above as high.

[2]See Siegel (1956) p.111.

The Analysis

The Median Test was used to conduct 99 two-way classification analyses in the study. In each instance, responses from 12 Oregon community colleges and 13 secondary schools were tested to determine whether the medians of the two independent groups differed significantly, and whether they were drawn from populations with the same median. The testing of the combined median, which cast the data into a 2 x 2 matrix showed that except in two cases,[1] the community colleges and secondary schools were alike in their responses. The results of these tests are found in Appendix H.

Each of the 99 competencies was ranked. Rankings were based upon the combined median score for each of the professional competencies. The ten competencies with the highest median scores are contained in Table 6. The ten competencies with the lowest median scores are contained in Table 7. Median score ranks of all competencies are included in Tables 1 through 5.

Results of Factor Analysis

Factor analysis was used for the purpose of determining the specific factors which were present among the 99 competencies included in the study. The procedures used permitted the identification of groups or clusters of competencies in which, according to generated factor loadings, there existed a high degree of correlation with the extracted factors. Only those competencies with factor loadings of $\pm$.450 or

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[1]The two cases rejected were competencies 15 and 19.

greater were included in a factor. The results of the factor analysis were generated through the Q-Mode and R-Mode techniques. A description of the computer control data can be found in Appendix D and Appendix E.

Q-Mode Analysis

Q-Mode[1] technique involves the ordering of respondents according to the competencies in the study, and provides a measure of commonality among the numerous vocational-technical areas represented by the respondents. Results of the four-factor Q-Mode solution indicated that, in all instances, factor loadings were ±.91 or higher. The tabulated results of the Q-Mode technique can be found in Appendix L.

R-Mode Analysis

Generally, the R-Mode technique was considered as one of the most important procedures in the study. The literature indicates that a great majority of factor studies have used the R-Mode technique: Primarily, the R-Mode[1] clusters competencies according to the respondents in the study. The data were factor-analyzed three times using six-, five-, and four-factor solutions. Figure 2 lists the common factor variance accounted for in the twelve factor solution.

Factors generated by the R-Mode analysis resulted in factor loadings of ±.450 or higher. Negative loadings were considered in absolute terms. The five-factor and four-factor soluations resulted in the same total number of factor loadings in excess of ±.450; however, the loadings in the five-factor solution were more evenly distributed among the factors. Therefore, the five-factor solution was considered to best represent the data. Results of the R-Mode analysis using the five-factor solution appear in Tables 1 to 5. Each table is illustrative of a factor, and

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[1]See Appendix D for control card data.

contains a separate listing of spurious competencies, which are defined as those highest under one factor but with factor loadings of less than ±.450. Factors and corresponding subfactor designations were assigned after the data were analyzed. The names of the factors were judgmentally assigned, and are assumed to be indicative of the general nature of the competencies which loaded under each factor. All significant loadings were clearly defined under one of the five generated factors. There was no factor overlap among the competencies which loaded ±.450 or higher.

FIGURE 2. Percentage of common factor variance for the R-Mode analysis

Factor	Percentage	Cumulative percentage
1	18.62441	18.62441
2	6.49158	25.11599
3	5.92563	31.04161
4	3.74408	34.78570
5	3.20282	37.98852
6	2.99807	40.98658
7	2.88956	43.87614
8	2.67003	46.54617
9	2.56542	49.11159
10	2.35793	51.46953
11	2.20393	53.67346
12	2.17584	55.84929

Factor 1. Instructional Organization

A total of 24 competencies loaded under Factor 1 with a factor loading of -.478 or higher. Three subfactors were clearly identifiable within the primary factor. The first subfactor, Program Development, contained six competencies. Four competencies loaded under the subfactor, Program Operation. Program Coordination, the third subfactor, contained two competencies. Factor I was the only factor with identifiable subfactors, and contained the greatest number of competencies.

Factor I generally contained some of the lowest median rakings. Table 1 contains the specific competencies, factor loadings, response breakdown, median scores, and median ranks which were included in Factor 1. Table 6 locates the Quantile Distribution[1] of each Domain level (median) found in Factor I.

Factor II. Instructional Process

A total of eleven competencies with factor loadings of -.450 or higher were generated for Factor II. Table 2 contains the specific competencies and other data included in Factor III. Table 6 locates the Quantile Distribution of each Domain Level (median) found in Factor II.

Factor III. Professional Image

Eleven competencies clustered under this factor with factor loadings of .456 and above. Factor III generally contained some of the lowest median rankings. Table 3 describes the specific competencies and other data included in Factor III. Table 6 locates the Quantile Distribution of each Domain Level (median) found in Factor III.

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[1]See page for an explanation of the Quantile Distribution.

TABLE 1. Factor I - Instructional Organization

	Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
Program Development	8.	interpret the innovative provisions of the Vocational Act as amended in 1968	-.607	cc	16	13	12	2	2	2	1.574	98
				ss	11	14	7	6	2	7		
	12.	interpret the goals of general education	-.523	cc	3	9	15	11	3	6	3.738	62
				ss	1	5	9	10	7	15		
	16.	interpret the history of vocational education	-.523	cc	20	16	7	2	1	1	1.917	97
				ss	12	20	5	1	4	5		
	18.	interpret state certification requirements for instructors	-.536	cc	6	24	10	3	-	4	2.229	96
				ss	6	24	9	2	1	5		
Program Development	19.	assist in the development of the total (community college/secondary school) program	-.602	cc	5	4	8	14	6	10	4.289	48
				ss	4	7	4	5	5	22		
Program Development	23.	interpret the state specifications and requirements for vocational facilities.	-.614	cc	10	8	15	4	7	3	3.120	77
				ss	4	7	14	8	3	11		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
Program Development	25.	interpret the philosophy of the comprehensive (community college/ secondary school)	-.633	cc	5	9	13	9	3	8	3.220	76
				ss	5	10	12	6	3	11		
	30.	interpret the philosophy of the (community College/secondary school) in providing vocational programs for the student	-.523	cc	1	6	12	10	8	10	4.150	54
				ss	4	3	8	10	4	18		
Program Operation	40.	provide special training or assistance to disadvantages and handicapped students	-.481	cc	4	7	11	9	7	9	3.467	68
				ss	4	3	19	7	7	7		
Program Development	41.	use the State Plan for Vocational Education in securing reimbursement for vocational programs	-.603	cc	15	9	13	4	3	3	2.574	95
				ss	10	11	14	2	4	6		
	43.	interpret the history of education	-.554	cc	22	12	9	1	2	1	1.543	99
				ss	23	15	6	2	-	1		
	45.	formulate your own educational philosophy	-.515	cc	2	-	5	8	6	26	5.540	20
				ss	3	3	8	3	7	23		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
Program Development	46.	utilize state guidelines for curriculum planning	-.597	cc	2	11	11	12	3	8	3.425	71
				ss	4	5	16	5	2	15		
Program Coordination	48.	identify the similarities and differences between the goals of general and vocational education	-.648	cc	5	4	8	11	9	10	4.184	52
				ss	3	3	11	8	4	18		
	52.	interpret the objectives of vocational education to others	-.530	cc	1	6	11	13	7	9	3.889	59
				ss	2	8	12	5	4	16		
Program Coordination	55.	conduct community surveys to improve instruction or plan programs	-.596	cc	8	8	8	8	5	10	3.375	74
				ss	7	10	8	9	3	10		
	63.	distinguish between two or more educational philosophies	-.518	cc	6	6	10	19	2	4	3.000	83.5
				ss	10	8	7	12	3	7		
Program Operation	71.	use counseling techniques to help students solve personal and social problems	-.478	cc	-	8	17	9	6	7	3.409	73
				ss	4	5	16	5	3	14		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
Program Development	83.	interpret the socio-economic class structure of the local community in relation to students enrolled in vocational programs.	-.616	cc	9	8	10	6	7	7	3.452	72
				ss	1	9	11	9	6	11		
	84.	identify acceptable community social behaviors for instructors	-.483	cc	7	10	12	11	2	5	3.042	80
				ss	7	11	12	11	-	6		
	86.	identify local community power structures and pressure groups	-.505	cc	13	7	6	12	3	6	3.000	83.5
				ss	7	10	4	14	4	8		
	89.	interpret school policies	-.509	cc	3	9	15	9	4	7	3.333	75
				ss	4	11	9	8	3	12		
Program Operation	90.	provide programs for the student with special needs	-.500	cc	2	6	7	8	7	17	4.633	39
				ss	1	1	12	8	8	17		
Program Operation	92.	write articles for news releases	-.627	cc	15	12	11	5	3	1	2.707	92
				ss	7	7	18	6	3	6		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
		Spurious Competencies										
	1	Assist (com col/sec sch) administrators initiate and maintain vocational programs.	-.419	cc	-	-	7	6	9	25	5.613	12.5
				ss	-	1	10	5	3	28		
	2	Interpret the provisions of instructor tenure laws	-.413	cc	14	16	9	6	1	1	2.794	88
				ss	8	26	8	-	-	5		
	14	Participate in the supervision of non-vocational extracullar activities	-.370	cc	11	14	14	4	4	-	2.688	93
				ss	8	8	18	6	2	5		
	17	Relate technological advances to laboratory and classroom instruction	-.304	cc	-	1	3	10	9	24	5.000	32
				ss	2	1	11	7	3	23		
	20	Interpret state certification requirements for instructors	-.169	cc	1	3	7	2	11	23	5.613	12.5
				ss	1	-	5	8	3	30		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	Factor loading		Responses 1 Knowledge	2 Comprehension	3 Application	4 Analysis	5 Synthesis	6 Evaluation	Domain level (Mdn)	Median Ranking
	22	Secure on-the-job training positions for students	-.396	cc	2	4	10	7	9	15	4.206	50
				ss	4	5	10	10	2	16		
	34	Interpret the legal liabilities of a teacher	-.313	cc	7	17	9	10	2	2	3.100	79
				ss	5	13	16	7	2	4		
	36	Relate to students from different socio-economic backgrounds	-.379	cc	1	1	12	9	6	18	4.182	53
				ss	-	9	9	13	5	11		
	51	Relate the vocational program to other instructional programs	-.409	cc	1	6	11	10	10	9	4.452	42
				ss	-	2	7	11	8	19		
	65	Use a student centered teaching style	-.431	cc	1	-	5	9	7	25	5.250	26.5
				ss	-	1	12	7	9	18		
	66	Identify students in need of counseling or guidance	-.391	cc	1	-	1	16	8	21	4.619	40
				ss	2	3	6	13	4	19		

TABLE 1. (Continued)

Subfactor	Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
	73	Aid students in entering educational or occupational training programs beyond the (comm col/sec sch) level	-.439	cc	2	4	12	7	9	13	4.312	47
				ss	1	3	12	9	5	17		
	77	Lead a conference	-.434	cc	1	10	9	12	6	9	3.552	67
				ss	7	6	13	6	3	12		
	94	Conduct follow-up studies for purposes of determining effectiveness of instruction	-.394	cc	-	1	5	16	6	19	5.071	30
				ss	-	-	8	2	14	23		
	96	Articulate your instructional program with other educational institutions or agencies	-.368	cc	1	-	8	13	11	14	4.370	44
				ss	1	5	12	10	7	12		
	98	Screen and select students for your program	-.442	cc	11	7	3	8	4	14	3.767	61
				ss	8	4	10	7	5	13		
	99	Coordinate and supervise cooperative work experience programs	-.411	cc	2	4	10	11	5	15	4.333	46
				ss	3	5	13	1	7	18		

TABLE 2. Factor II - Instructional Process

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
13	provide practical shop or laboratory experiences to enhance classroom learning	-.529	cc	-	-	2	3	8	34	5.956	1
			ss	-	-	1	4	8	34		
33	motivate students in the classroom, shop or laboratory	-.597	cc	-	-	2	2	6	37	5.819	4
			ss	-	-	7	3	5	32		
37	utilize individualized instruction materials and techniques	-.510	cc	-	1	11	2	9	24	5.578	17
			ss	-	-	6	7	7	27		
49	develop classroom instruction based upon the individual needs of the learner	-.546	cc	-	-	2	7	9	29	5.729	7
			ss	-	1	3	3	8	32		
50	provide appropriate practice for development of basic skills	-.476	cc	-	3	3	7	10	24	5.630	9.5
			ss	-	1	4	7	5	30		
56	use the information contained in professional journals for personal improvement of instruction	-.510	cc	-	2	15	8	6	16	3.611	64
			ss	2	2	21	10	2	10		

TABLE 2. (Continued)

Competency number	Competencies	Factor loading		Responses: 1 Knowledge	2 Comprehension	3 Application	4 Analysis	5 Synthesis	6 Evaluation	Domain level (Mdn)	Median Ranking
59	teach at the student's level and rate of learning	-.595	cc	-	-	2	8	4	33	5.766	6
			ss	-	-	3	5	8	31		
61	maintain student attention during classroom presentations or demonstrations	-.560	cc	-	-	9	7	8	23	5.147	29
			ss	-	1	13	6	9	18		
78	develop student learning activities to facilitate instruction	-.566	cc	-	-	4	11	10	22	5.520	22
			ss	-	-	8	5	8	26		
81	relate current events associated with your subject matter area to classroom instruction	-.453	cc	-	1	11	11	7	17	4.342	45
			ss	2	1	16	8	9	11		
93	be stimulating in your work as an instructor	-.468	cc	-	-	4	3	9	31	5.630	9.5
			ss	-	-	8	2	14	23		
	Spurious Competencies										
3	Conduct a shop or laboratory demonstration for an individual student	-.443	cc	-	1	4	5	9	28	5.618	11
			ss	-	-	3	6	8	30		

TABLE 2. (Continued)

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
6	Ask questions during classroom presentations or demonstrations to aid student learning	-.412	cc	-	1	1	8	11	26	5.578	17
			ss	-	-	1	11	10	25		
9	Select appropriate equipment and supplies for instructional purposes	-.446	cc	-	1	4	4	8	30	5.809	5
			ss	-	-	1	4	4	38		
10	Arrange and conduct field trips	-.387	cc	1	2	11	11	2	20	5.250	26.5
			ss	1	1	6	8	6	25		
27	Revise courses in accordance with current occupational trends	-.336	cc	-	-	2	5	11	29	5.519	23
			ss	-	-	3	4	11	29		
39	Interpret your vocational program to others	-.302	cc	-	6	2	13	9	17	5.000	32
			ss	-	3	5	11	5	23		
44	Build a display for instructional purposes	-.425	cc	2	7	14	7	6	11	3.929	57
			ss	1	6	11	7	7	15		

TABLE 2. (Continued)

Competency number	Competencies	Factor loading	Responses	Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain leve (Mdn)	Median Ranking
47	Draw from personal avocational interests to enrich instruction	-.231	cc	-	1	7	11	11	17	4.868	35
			ss	-	3	13	5	8	18		
72	Summarize classroom presentations	-.354	cc	-	3	5	12	8	19	4.912	34
			s	-	3	9	8	9	18		
91	Use programmed learning materials	-.353	cc	1	10	11	9	6	10	3.864	60
			ss	3	1	13	13	4	13		
97	Interpret safety rules and regulations to students	-.385	cc	3	8	9	7	5	15	4.045	56
			ss	3	4	14	4	5	17		

TABLE 3. Factor III - Professional Image

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
7	adapt your appearance and appeal to acceptable standards for instruction	.527	cc	6	1	21	-	8	11	2.678	94
			ss	5	6	16	3	3	14		
29	adhere to the code of ethics adopted in your (community college/secondary school)	.746	cc	5	3	12	7	9	11	3.567	66
			ss	2	6	18	8	4	9		
42	organize or work with local vocational advisory committee	.474	cc	2	3	8	8	8	18	4.136	55
			ss	3	5	9	3	5	22		
58	maintain a clean, orderly laboratory or classroom	.604	cc	3	3	20	6	4	11	3.446	69
			ss	3	3	17	4	8	12		
67	participate in professional organizations related to your subject matter area	.598	cc	2	2	14	8	7	14	3.625	63
			ss	4	7	16	8	4	8		
70	utilize the services of local and state vocational education agencies	.469	cc	5	9	16	11	1	5	3.118	78
			ss	5	7	18	5	3	9		

TABLE 3. (Continued)

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
75	maintain discipline in the classroom, shop or laboratory	.614	cc	-	3	17	7	2	18	4.222	49
			ss	-	2	12	11	5	17		
76	participate in outside trade, business, or professional organizations related to your subject matter area	.545	cc	2	3	15	5	9	13	3.441	70
			ss	3	7	19	9	3	6		
79	communicate your ideas or point of view to other instructors or administrators	.456	cc	-	-	8	11	13	15	4.813	36
			ss	-	1	8	14	3	21		
82	inform students of the nature and requirements of specific occupations	.640	cc	2	3	7	5	12	18	4.675	37
			ss	1	4	9	9	12	12		
85	work cooperatively with people in the community	.572	cc	2	2	13	9	8	13	3.912	58
			ss	1	4	18	8	6	10		
	Spurious Competencies										
4	Involve yourself in civic community activities not directly related to the school	.410	cc	7	7	18	5	5	5	2.910	86
			ss	3	14	21	5	1	3		

TABLE 3. (Continued)

Competency number	Competencies	Factor loading		Responses: 1 Knowledge	2 Comprehension	3 Application	4 Analysis	5 Synthesis	6 Evaluation	Domain level (Mdn)	Median Ranking
15	Aid the student in obtaining job placement after training	.417	cc	2	4	6	7	10	18	4.382	43
			ss	2	5	13	10	4	13		
21	Locate available standardized tests	.226	cc	9	9	15	6	4	4	2.786	89.5
			ss	12	9	13	5	3	5		
28	Maintain student performance or progress records	.412	cc	2	2	12	11	4	16	4.642	38
			ss	-	3	10	6	3	25		
64	Maintain necessary report forms required by state or federal agencies	.401	cc	13	7	11	11	3	2	2.786	89.5
			ss	7	12	17	6	2	3		
88	Make use of available guidance and counseling services within the (community college/secondary school)	.351	cc	2	3	15	12	5	10	3.000	83.5
			ss	2	5	20	9	5	6		

Factor IV. Preparation for Instruction

Eleven competencies were clustered under this factor with loadings of .455 and higher. The items listed in this factor pertain directly to instructional preparation and evaluation of instructional results. Table 4 contains the specific competencies and other data included in Factor IV. Table 8 locates the Quantile Distribution of each Domain Level (median) found in Factor IV.

Factor V. Extracurricular Activities

This factor did not meet the criteria established for the naming of a factor, but is included in order to account for the 99 competencies contained in the study. Two spurious competencies with factor loadings of .371 and .372 are contained in this item. Both are ranked in the lower 10 percent of the median ranking. Table 5 contains the specific competencies and other data included in Factor V. Table 8 locates the Quantile Distribution of each Domain Level (median) found in Factor V.

Quantile Distribution of Domain Levels (Medians)

The quantile distribution represents a useful method of describing a group of observations. A quantile is a concept, and percentiles, deciles, and quartiles are examples of it. A quantile is a point on a number scale which is assumed to underlie a set of observations. The quantile points on this scale are separated into three major quartile units, Q_1, Q_2, and Q_3, which divides the group of observations into four quarters. For example, Q_1 is that point on the number scale such that one-fourth of the observations lie below it; one-half below Q_2, and three-quarters below Q_3. For convenience and ease in understanding the relationship of the domain distributions, the combined medians generated

in the median test have been placed in quartile (Q_1, Q_2, and Q_3) and percentile (P_1,.....,P_{99}) units. Thus, the domain levels (medians) of the 99 competencies have been distributed as follows:

Q_1 (P_{25}) = 3.220

Q_2 (P_{50}) = 4.200

Q_3 (P_{75}) = 5.250

Table 8 contains the Quantile Distribution of the Domain Levels (medians) found in the study for the 99 professional competencies.

TABLE 4. Factor IV - Preparation for Instruction

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
11	interpret the goals and objectives of vocational education	.479	cc	2	2	6	12	8	17	5.286	25
			ss	1	3	4	6	6	27		
24	develop audio-visual materials for instructional purposes	.559	cc	1	4	8	8	11	15	4.570	41
			ss	1	2	8	11	3	22		
31	select textbooks and instructional materials for the classroom, shop or laboratory	.459	cc	-	-	2	7	3	35	5.922	2
			ss	-	1	2	9	6	29		
32	develop objective tests to measure achievement	.603	cc	-	-	3	8	5	31	5.900	3
			ss	1	-	2	8	7	29		
38	relate the course of study to measurable performance objectives	.694	cc	-	-	-	6	15	26	5.596	14.5
			ss	1	1	4	4	11	26		
53	break down an occupation or job into its component parts for instructional or guidance purposes	.540	cc	1	1	4	9	11	21	5.150	28
			ss	1	2	7	9	9	19		

TABLE 4. (Continued)

Competency number	Competencies	Factor loading		Responses 1 Knowledge	2 Comprehension	3 Application	4 Analysis	5 Synthesis	6 Evaluation	Domain level (Mdn)	Median Ranking
54	write performance objectives	.677	cc	-	2	3	5	7	30	5.660	8
			ss	3	4	4	3	7	26		
62	make a daily lesson plan	.455	cc	7	4	12	6	5	13	3.577	65
			ss	9	3	11	7	6	11		
68	evaluate the effectiveness of a classroom or laboratory demonstration	.544	cc	-	-	3	5	8	31	5.539	21
			ss	-	1	6	8	4	28		
74	develop performance tests to measure achievement	.621	cc	-	-	6	6	9	26	5.578	17
			ss	1	1	4	9	7	25		
80	develop <u>subjective</u> tests to measure achievement	.518	cc	2	5	8	8	8	16	4.200	51
			ss	2	6	10	12	5	12		
	<u>Spurious Competencies</u>										
5	Promote and teach adult vocational programs	.440	cc	1	5	3	7	8	23	5.000	32
			ss	5	-	11	3	4	24		

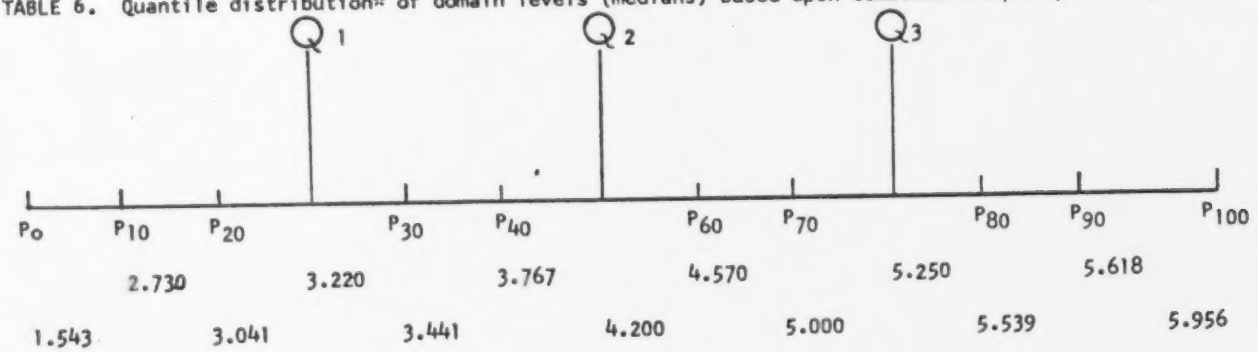
TABLE 4. (Continued)

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
26	Select appropriate audio-visual materials for instructional purposes	.415	cc	-	1	7	6	8	25	5.596	14.5
			ss	-	1	6	8	5	27		
57	Assess the validity, reliability, and difficulty of instructor-made tests	.449	cc	-	1	3	9	11	23	5.342	24
			ss	1	5	6	6	8	21		
60	Utilize written shop, classroom, and laboratory equipment organizational plans	.420	cc	2	6	13	14	4	8	3.000	83.5
			ss	1	3	22	6	7	8		
69	Use the results of standardized test scores for job placement	.449	cc	10	11	11	8	3	4	3.041	81
			ss	5	8	13	8	2	11		
95	Evaluate teaching effectiveness by measuring student achievement	.355	cc	-	1	3	9	7	27	5.541	19
			ss	-	-	2	11	12	22		

TABLE 5. Factor V - Extra-curricular Duties

Competency number	Competencies	Factor loading		Responses: Knowledge 1	Comprehension 2	Application 3	Analysis 4	Synthesis 5	Evaluation 6	Domain level (Mdn)	Median Ranking
	Spurious Competencies										
35	Direct, advise, or promote student participation in competitive events or youth organizations related to vocational education	.371	cc	8	8	21	3	3	4	2.853	87
			ss	4	5	13	5	5	15		
87	Operate duplicating equipment	.372	cc	17	5	18	3	1	3	2.730	91
			ss	13	3	21	-	3	7		

TABLE 6. Quantile distribution* of domain levels (medians) based upon combined frequency of responses.



(1.0) KNOWLEDGE

(2.0) COMPREHENSION

(3.0) APPLICATION

(4.0) ANALYSIS

(5.0) SYNTHESIS

(6.0) EVALUATION

*Glass and Stanley (1970) p. 33-38.

Conclusions

The determination of the hierarchical levels of 99 professional vocational competencies was the primary question to which the present study was directed. Domain Levels were calculated for each of the 99 professional competencies, and distributed as follows in the major classifications of the quantile scale: $Q_1(P_{25}) = 3.220$; $Q_2(P_{50}) = 4.200$; *and* $Q_3(P_{75}) = 5.250$. *For the purpose of developing* useful vocational teacher preparation curricula, it was concluded that 57 of the 99 professional competencies could be classified as having high levels of correlation, and could be grouped into four meaningful competency clusters typified by the study's sample population.

Significant differences or independence of the two groups in the study were produced by application of the Median Test. On the basis of the analysis applied in the Median Test, 97 of the 99 null hypotheses were retained. The hierarchical nature of the domain levels precluded the determination of the differences as being interpreted purely to chance.

The conclusion of commonality among the study's sample population was strengthened by strong correlations in the Q-Mode analysis. The data generated indicated vocational-technical educators resembled one another with regard to the hierarchical values assigned to the professional education competencies. The results of studies by Gunderson (1971), Lindahl (1971), and Miller (1971), Halfin and Courtney (1970), and Cotrell (1970) generally tend to support these findings.

The application of the R-Mode technique to data gathered from a variety of vocational educators in the field resulted in the grouping of 57 professional competencies into four primary factors. Therefore, it

may be concluded that factor analysis applied to data with numerous underlying variables is a useful technique for identifying common factors from among the different competencies and professional specialists.

Implications

Based upon the results of the study, the following statements are proposed as having significant implications for vocational pre-service and in-service teacher preparatory programs:

1. The universality of responses shown to exist between community college and secondary school vocational educators indicates that teacher preparatory programs founded upon common professional competencies would meet the majority needs of both educat. nal levels. Therefore, the proliferating of courses to accommodate each level is unnecessary.
2. Since the results of this study indicate a similarity in many functional behaviors within the 99 professional competencies, it may be implied that the educational needs of vocational educators generally are not as complex or diverse as it may have been assumed.
3. The commonality of responses shown to exist among the respondents of this study, and the commonality found in the Western-states studies of Gunderson (1971), Lindahl (1971), and Miller (1971), suggest that the preparation and professional certification of community college and secondary school instructors may be accomplished through regional or reciprocal cooperative

agreements between the states.

4. The results of the study suggest that vocational teacher preparatory programs should place greater emphasis on the individualization of instruction, teaching at individual learning rates, writing of performance objectives, evaluation of instruction, and interpretating the goals and objectives of vocational education.
5. The results of the analysis indicate that emphasis in several areas of professional development need not extend beyond the Knowledge (1) or Comprehension (2) domain levels.
6. The commonality of agreement reflected by the respondents in this study suggests that vocational teacher preparatory programs be considered in terms of their relevancy to needed performance levels required in the field, as they are described in the cognitive domain.

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APPENDIX

APPENDIX A

_____
Name

_____
Community College

_____
Secondary School

INSTRUCTOR QUESTIONNAIRE

The Professional Education Competencies of Selected Community College and Secondary School Instructors

Purpose of Questionnaire: The purpose of this questionnaire is to seek your assistance in providing information which will be useful in the development of curriculum for colleges and universities seeking to offer relevant teacher education courses and programs for community college and secondary school vocational education instructors.

INSTRUCTIONS FOR COMPLETION OF THE QUESTIONNAIRE

A. In the spaces provided below, check (x) the appropriate subject matter area in which you teach the majority of your courses

( ) Agriculture (Forestry, Horticulture, Production)

( ) Business and Office

( ) Distributive (mid-management and marketing)

( ) Health Occupations

( ) Home Economics

( ) Trade and Industrial

( ) Service Occupation

( ) Technical

( ) Other (specify) _____

B. This questionnaire contains professional education competencies for community college and secondary school instructors. In relation to your job, you are asked to indicate your best judgement about the hierarchical level you consider NECESSARY for each competency.

C. Do not take too much time in thinking about any particular item. Please do not leave out any item--there are no right or wrong answers. We are primarily concerned about your judgment regarding the level of competencies needed by vocational education instructors.

D. For each item please circle the rating (1, 2, 3, 4, 5, 6) which most closely represents YOUR JUDGMENT. If your judgment is not precisely represented by one of the choices, pick the one which comes closest. DO NOT LEAVE ANY BLANKS.

Here is an example:

Please read the fold-out before attempting to answer the question below.

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

1. develop objective tests to measure achievement

knowledge comprehension application analysis synthesis evaluation

1 2 3 4 5 (6)

This person, in marking the "6" rating, considered that his job required complete mastery of this activity.

INSTRUCTIONS: When answering the questions, if any doubt should arise regarding the interpretation of a definition, please direct your comments to the interviewer. He is with you for just that purpose.

REMEMBER: This is not a test. Refer frequently to the definitions on the green fold-out.

PROFESSIONAL EDUCATION COMPETENCIES QUESTIONNAIRE

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

		knowledge	comprehension	application	analysis	synthesis	evaluation
1.	assist (com col/sec sch) administrators initiate and maintain vocational programs	1	2	3	4	5	6
2.	interpret the provisions of instructor tenure laws	1	2	3	4	5	6
3.	conduct a shop or laboratory demonstration for an individual student	1	2	3	4	5	6
4.	involve yourself in civic community activities not directly related to the school	1	2	3	4	5	6
5.	promote and teach adult vocational programs	1	2	3	4	5	6
6.	ask questions during classroom presentations or demonstrations to aid student learning	1	2	3	4	5	6
7.	adapt your appearance and apparel to acceptable standards for instructors	1	2	3	4	5	6
8.	interpret the innovative provisions of the Vocational Act as amended in 1968	1	2	3	4	5	6
9.	select appropriate equipment and supplies for instructional purposes	1	2	3	4	5	6
10.	arrange and conduct field trips	1	2	3	4	5	6
11.	interpret the goals and objectives of vocational education	1	2	3	4	5	6
12.	interpret the goals of general education	1	2	3	4	5	6
13.	provide practical shop or laboratory experiences to enhance classroom learning	1	2	3	4	5	6
14.	participate in the supervision of non-vocational extracurricular activities	1	2	3	4	5	6
15.	aid the student in obtaining job placement after training	1	2	3	4	5	6
16.	interpret the history of vocational education	1	2	3	4	5	6
17.	relate technological advances to laboratory and classroom instruction	1	2	3	4	5	6

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

	knowledge	comprehension	application	analysis	synthesis	evaluation
18. interpret state certification requirements for instructors	1	2	3	4	5	6
19. assist in the development of the total(community college/secondary school) program	1	2	3	4	5	6
20. prepare budgetary requests for vocational programs	1	2	3	4	5	6
21. locate available standardized tests	1	2	3	4	5	6
22. secure on-the-job training positions for students	1	2	3	4	5	6
23. interpret the state specifications and requirements for vocational facilities.	1	2	3	4	5	6
24. develop audio-visual materials for instructional purposes	1	2	3	4	5	6
25. interpret the philosophy of the comprehensive (community college/secondary school)	1	2	3	4	5	6
26. select appropriate audio-visual materials for instructional purposes	1	2	3	4	5	6
27. revise courses in accordance with current occupational trends	1	2	3	4	5	6
28. maintain student performance or progress records	1	2	3	4	5	6
29. adhere to the code of ethics adopted in your (community college/secondary school)	1	2	3	4	5	6
30. interpret the philosophy of the (com col/sec sch) in providing vocational programs for the student	1	2	3	4	5	6
31. select textbooks and instructional materials for the classroom, shop or laboratory	1	2	3	4	5	6
32. develop objective tests to measure achievement	1	2	3	4	5	6
33. motivate students in the classroom, shop or laboratory	1	2	3	4	5	6
34. interpret the legal liabilities of a teacher	1	2	3	4	5	6
35. direct, advise, or promote student participation in competitive events or youth organizations related to vocational education	1	2	3	4	5	6

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

	knowledge	comprehension	application	analysis	synthesis	evaluation
36. relate to students from different socio-economic backgrounds	1	2	3	4	5	6
37. utilize individualized instruction materials and techniques	1	2	3	4	5	6
38. relate the course of study to measurable performance objectives	1	2	3	4	5	6
39. interpret your vocational program to others	1	2	3	4	5	6
40. provide special training or assistance to disadvantaged and handicapped students	1	2	3	4	5	6
41. use the State Plan for Vocational Education in securing reimbursement for vocational programs	1	2	3	4	5	6
42. organize or work with local vocational advisory committee	1	2	3	4	5	6
43. interpret the history of education	1	2	3	4	5	6
44. build a display for instructional purposes	1	2	3	4	5	6
45. formulate your own educational philosophy	1	2	3	4	5	6
46. utilize state guidelines for curriculum planning	1	2	3	4	5	6
47. draw from personal avocational interests to enrich instruction	1	2	3	4	5	6
48. identify the similarities and differences between the goals of general and vocational education	1	2	3	4	5	6
49. develop classroom instruction based upon the individual needs of the learner	1	2	3	4	5	6
50. provide appropriate practice for development of basic skills	1	2	3	4	5	6
51. relate the vocational program to other instructional programs	1	2	3	4	5	6
52. interpret the objectives of vocational education to others	1	2	3	4	5	6
53. break down an occupation or job into its component parts for instructional or guidance purposes	1	2	3	4	5	6
54. write performance objectives	1	2	3	4	5	6

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

	knowledge	comprehension	application	analysis	synthesis	evaluation
	1	2	3	4	5	6
55. conduct community surveys to improve instruction or plan programs	1	2	3	4	5	6
56. use the information contained in professional journals for personal improvement or improvement of instruction	1	2	3	4	5	6
57. assess the validity, reliability and difficulty of instructor-made tests	1	2	3	4	5	6
58. maintain a clean, orderly laboratory or classroom	1	2	3	4	5	6
59. teach at the student's level and rate of learning	1	2	3	4	5	6
60. utilize written shop, classroom, and laboratory equipment organizational plans	1	2	3	4	5	6
61. maintain student attention during classroom presentations or demonstrations	1	2	3	4	5	6
62. make a daily lesson plan	1	2	3	4	5	6
63. distinguish between two or more educational philosophies	1	2	3	4	5	6
64. maintain necessary report forms required by state or federal agencies	1	2	3	4	5	6
65. use a student-centered teaching style	1	2	3	4	5	6
66. identify students in need of counseling or guidance	1	2	3	4	5	6
67. participate in professional organizations related to your subject matter area	1	2	3	4	5	6
68. evaluate the effectiveness of a classroom or laboratory demonstration	1	2	3	4	5	6
69. use the results of standardized test scores for job placement	1	2	3	4	5	6
70. utilize the services of local and state vocational education agencies	1	2	3	4	5	6
71. use counseling techniques to help students solve personal and social problems	1	2	3	4	5	6

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

	knowledge	comprehension	application	analysis	synthesis	evaluation
72. summarize classroom presentations	1	2	3	4	5	6
73. aid students in entering educational or occupational training programs beyond the (com col/sec sch) level	1	2	3	4	5	6
74. develop performance tests to measure achievement	1	2	3	4	5	6
75. maintain discipline in the classroom, shop or laboratory	1	2	3	4	5	6
76. participate in outside trade, business, or professional organizations related to your subject matter area	1	2	3	4	5	6
77. lead a conference	1	2	3	4	5	6
78. develop student learning activities to facilitate instruction	1	2	3	4	5	6
79. communicate your ideas or point of view to other instructors or administrators	1	2	3	4	5	6
80. develop subjective tests to measure achievement	1	2	3	4	5	6
81. relate current events associated with your subject matter area to classroom instruction	1	2	3	4	5	6
82. inform students of the nature and requirements of specific occupations	1	2	3	4	5	6
83. interpret the socio-economic class structure of the local community in relation to students enrolled in vocational programs	1	2	3	4	5	6
84. identify acceptable community social behaviors for instructors	1	2	3	4	5	6
85. work cooperatively with people in the community	1	2	3	4	5	6
86. identify local community power structures and pressure groups	1	2	3	4	5	6
87. operate duplicating equipment	1	2	3	4	5	6
88. make use of available guidance and counseling services within the (community college/secondary school)	1	2	3	4	5	6

Based on your teaching experience, what hierarchical level do you consider NECESSARY in your work as an instructor to:

	knowledge	comprehension	application	analysis	synthesis	evaluation
89. interpret school policies	1	2	3	4	5	6
90. provide programs for the student with special needs	1	2	3	4	5	6
91. use programmed learning materials	1	2	3	4	5	6
92. write articles for news releases	1	2	3	4	5	6
93. be stimulating in your work as an instructor	1	2	3	4	5	6
94. conduct follow-up studies for purposes of determining effectiveness of instruction	1	2	3	4	5	6
95. evaluate teaching effectiveness by measuring student achievement	1	2	3	4	5	6
96. articulate your instructional program with other educational institutions or agencies	1	2	3	4	5	6
97. interpret safety rules and regulations to students	1	2	3	4	5	6
98. screen and select students for your program	1	2	3	4	5	6
99. coordinate and supervise cooperative work experience programs	1	2	3	4	5	6

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APPENDIX B

Results of Chi-square Analysis Using the Median Test*

Competency number	Computed value	Null Hypothesis	Competency number	Computed value	Null Hypothesis
1	.017	Retain.	27	.000	Retain
2	.044	"	28	2.086	"
3	.045	"	29	1.064	"
4	.019	"	30	.039	"
5	.000	"	31	1.223	"
6	.000	"	32	.046	"
7	.618	"	33	.087	"
8	.083	"	34	.000	"
9	2.478	"	35	1.061	"
10	.068	"	36	1.800	"
11	3.460	"	37	.071	"
12	.024	"	38	.000	"
13	.000	"	39	1.087	"
14	2.769	"	40	.038	"
15	4.263	Reject**	41	.015	"
16	2.321	Retain	42	.000	"
17	.000	"	43	.000	"
18	.000	"	44	.069	"
19	4.286	Reject**	45	.064	"
20	1.557	Retain	46	.000	"
21	.017	"	47	.002	"
22	1.076	"	48	.017	"
23	2.205	"	49	.018	"
24	.000	"	50	1.080	"
25	.000	"	51	2.086	"
26	.000	"	52	1.543	"

Competency number	Computed value	Null Hypothesis	Competency number	Computed value	Null Hypothesis
53	.043	Retain	81	1.151	Retain
54	.039	"	82	1.087	"
55	.000	"	83	1.064	"
56	2.108	"	84	.000	"
57	.042	"	85	1.088	"
58	.017	"	86	.000	"
59	.048	"	87	.000	"
60	.000	"	88	.000	"
61	.069	"	89	.017	"
62	.000	"	90	.000	"
63	.017	"	91	.070	"
64	.000	"	92	1.400	"
65	1.543	"	93	2.132	"
66	1.919	"	94	.017	"
67	3.507	"	95	.068	"
68	1.820	"	96	1.068	"
69	1.125	"	97	.043	"
70	.000	"	98	.000	"
71	.000	"	99	.0713	"
72	.000	"			
73	.000	"			
74	.000	"			
75	.022	"			
76	2.728	"			
77	1.064	"			
78	.038	"			
79	.037	"			
80	1.557	"			

* The significance level for testing the null hypothesis was set at .05 with the degrees of freedom equal to 1.

** The data being hierarchical in nature precludes the application of additional statistical tests.

APPENDIX C

Coding of Data Cards

A) Card 1

Column	
1-3	A03 to A04. Represents one of the 94 instructors used in the study.
4-5	1 to 25 represents one of the community colleges or secondary schools.
6	1 to 8. Represents one of the eight subject matter areas in which the respondents taught.
7	1. Data card number one.
8-80	Data. Response values of 1,2,3,4,5, and 6 which were assigned to the 73 competencies contained in the card.

B) Card 2

Column	
1-7	Same as above.
8	2. Data card number two.
9-26	Data. Response values of 1,2,3,4,5, and 6 which were assigned to the 26 competencies contained in the card.

APPENDIX D

Q-Mode Data Control Cards

```
7
8 JOB, 708090,SPAZ, DICK SPAZIANI
7
8TIME=1000
7
8MFBLKS=500
7
8COPY, 0=80
*GO
*DATA,TRANS,CARDS=2,ITEMS=99.
*CORR,QMODE,DIAG=ONE,OUTPUT.
*FACTOR,NUMFAC=4,EIGEN,OUTPUT.
*ROTATE,VARI,NONSTD,OUTPUT.
*TITLE BLOOM'S TAXONOMY
*LABEL,A01$A02$A03$ .....A18$
A19$ .....A38$
A39$ .....A58$
A59$ .....A78$
A79$ .....A94$.
*FORMAT (7X,73F1.0, 7X,26F1.0)
*END
Data cards inserted here
**
7
88
7
8REWIND,80
7
8*FAST
7
8LOGOFF
```

APPENDIX E

R-Mode Data Control Cards

```
7
8 JOB, 703090,SPAZ, DICK SPAZIANI
7
8TIME=1000
7
8MFBLKS=500
7
8COPY, 0=80
*GO
*DATA,CARDS=2,ITEMS=99.
*CORR,RMODE,DIAG=ONE,PRINTOUT=BOTH,OUTPUT.
*FACTOR,NUMFAC=5,EIGEN,OUTPUT.
*ROTATE,VARI,NONSTD,OUTPUT.
*TITLE BLOOM'S TAXONOMY
*LABEL,S01$S02$S03$ .....$18$
S19$ .....$38$
S39$ .....$58$
S59$ .....$78$
S79$ .....$98$
S99$.
*FORMAT(7X,73F1.0, 7X,26F1.0)
*END
Data cards inserted here
**
77
88
7
8REWIND,80
7
8*FAST
7
8LOGOFF
```

APPENDIX F

Results of Q-Mode Analysis

Respondent number	Factor loading	Respondent number	Factor loading	Respondent number	Factor loading
01	.967	33	.944	65	.940
02	.965	34	.947	66	.949
03	.920	35	.961	67	.958
04	.962	36	.938	68	.926
05	.979	37	.943	69	.961
06	.958	38	.976	70	.961
07	.978	39	.951	71	.943
08	.973	40	.950	72	.952
09	.955	41	.949	73	.940
10	.932	42	.961	74	.956
11	.961	43	.969	75	.971
12	.956	44	.949	76	.915
13	.926	45	.972	77	.919
14	.941	46	.960	78	.924
15	.954	47	.961	79	.950
16	.940	48	.928	80	.920
17	.982	49	.943	81	.926
18	.952	50	.963	82	.932
19	.940	51	.958	83	.952
20	.965	52	.962	84	.954
21	.920	53	.951	85	.952
22	.951	54	.960	86	.962
23	.951	55	.942	87	.960
24	.965	56	.931	88	.952
25	.953	57	.943	89	.982
26	.938	58	.972	90	.964
27	.939	59	.971	91	.946
28	.923	60	.953	92	.935
29	.917	61	.964	93	.932
30	.962	62	.968	94	.973
31	.944	63	.966		
32	.925	64	.954		

APPENDIX G

Oregon Community Colleges
Participating in the Study

1. Blue Mountain Community College
   2411 Carden Avenue N.W.
   Pendleton, Oregon 97801

2. Central Oregon Community College
   College Way
   Bend, Oregon 97701

3. Chemeketa Community College
   4389 Satter Drive N.E.
   Salem, Oregon 97303

4. Clackamas Community College
   19600 S. Molalla Avenue
   Oregon City, Oregon 97045

5. Clatsop Community College
   16th and Jerome
   Astoria, Oregon 97405

6. Lane Community College
   4000 East 30th Avenue
   Eugene, Oregon 97405

7. Linn-Benton Community College
   Box 249
   Albany, Oregon 97321

8. Mt. Hood Community College
   26000 SE Stark
   Gresham, Oregon 97030

9. Portland Community College
   12000 S.W. 49th Avenue
   Portland, Oregon 97219

10. Southwestern Community College
    Coos Bay, Oregon 97420

11. Treasure Valley Community College
    650 College Boulevard
    Ontario, Oregon 97914

12. Umpqua Community College
    Box 967
    Roseburg, Oregon 97470

APPENDIX H

Oregon Secondary Schools
Participating in the Study

13. Astoria Senior High School
1001 W. Marine Drive
Astoria, Oregon 97103

14. Clackamas High School
13801 S.E. Webster Rd.
Milwaukie, Oregon 97222

15. Estacada Union High School
350 N.W. 7th
Estacada, Oregon 07023

16. Forest Grove High School
1341 Pacific Ave.
Forest Grove, Oregon 97116

17. Gervais High School
Gervais, Oregon 97026

18. Hood River Valley High School
Rt. 4, Box 270
Hood River, Oregon 97301

19. Junction City High School
1135 West 6th
Junction City, Oregon 97448

20. Newport High School
322 N.E. Eads
Newport, Oregon 97365

21. Ontario High School
1115 W. Idaho Avenue
Ontario, Oregon 97914

22. Riddle High School
Riddle, Oregon 97469

23. McNary High School
505 Sandy Drive, N
Salem, Oregon 97303

24. Springfield High School
Springfield, Oregon 97477

25. Cascade Union High School
Rt. 1
Turner, Oregon 97329